Then let all of us who are, or who may be, examiners be merciful.

At the end of a paper so long as this one, and so full of the author's opinions, it may seem insatiate in me to express the hope that this discussion will not prove to be the conclusion of the matter. But I have not been concerned merely to express my opinions or even to get them assented to. I want to see a number of things done, certain relations formed, certain practises established, which I believe and which, apparently, many others believe would be greatly to the advantage of the elementary teaching of physics in this country. Now there is, of course, no individual or association of individuals having decisive general authority in the questions here raised. If anything much is to issue from this debate, it must come as the result of action by many institutions moving singly or, perhaps, in groups. But the National Educational Association, if its council should elect to consider the propositions of this paper or any similar ones, would probably have a good deal of influence in deciding their fate during the next few years.

Edwin H. Hall

Cambridge, Mass.,
April 2, 1910

CHARLES ABIATHAR WHITE

Soon after coming to Washington in 1895 I formed the acquaintance of Dr. White who then had an office in the National Museum. As one of the older men he knew many, if not all, of the distinguished geologists of the country, and especially those who had been active in building up the great state surveys and his fund of information in regard to them was most interesting to me. Among others he expressed his sincere admiration for Professor J. S. Newberry, of Columbia University, for whom I, in common with all of the older graduates of the School of Mines, had the greatest affection. I learned from Dr. White that it was largely through Professor Newberry that he obtained an election to the National Academy of Sciences, and I may add that Dr. White was quite proud of the fact that for the first time in its history the Academy by his election completed its membership; that is to say, he was the first one hundredth member of that distinguished body. It may not be too much to say that it was due to my efforts that Dr. White was led to prepare the delightful sketch of Newberry that appears among the biographical memoirs of the academy. It was the fact that among the older men none was left save White who was in a position to write from his own contemporary knowledge the details of the interesting career of Professor Newberry. It was also this argument which I presented as strongly as I possibly could to Dr. White that led him a few days later to send to my office the biographical notes which I now have much pleasure in presenting to the readers of Science, giving in full detail the career of the oldest and one of the ablest of our American paleontologists.

Marcus Benjamin

Charles Abiathar White was born at Dighton, Bristol County, Mass., on January 26, 1826. He was the second son of Abiathar White and his wife Nancy, daughter of Daniel Corey, of Dighton. His ancestors were among the early settlers of New England. Upon his father's side he was descended from a line of English-American yeomen, a leading object in the life of each of whom was the establishment of a family in a permanent home, with the ownership of his land in fee simple. The first of this line in America was William White, who established himself at "Windmill Point," in Boston about 1640. About the year 1700, his grandson, Cornelius White, removed from Boston to Taunton, Mass., whence he purchased a tract of land for a homestead farm, a part of which extended to the adjacent town of Dighton. This homestead has ever since, more than two hundred years, been owned and occupied by descendants bearing the family name. It was upon the Dighton

portion of the estate that Charles was born, one hundred and twenty-six years after the original purchase.

Each member of this yeoman line tilled his own ground and lived in much the same manner that his English ancestors had done, taking an active part in the local business and public affairs of the community in which he lived. Indeed they called themselves Englishmen, and all were loyal to their king until the occurrence of those acts which led to the war for American Independence, when they were all ardent patriots. When hostilities began the grandfather and great-grandfather of Dr. White, the tombstone of each of whom bears the inscription "Captain Cornelius White," hastened to join in the great struggle upon the patriot side. The younger enlisted as a minute man immediately after the battle of Lexington, when he was barely twenty years old. The elder had already served as captain of militia in the colonial wars of his time, and upon the beginning of the great struggle he was appointed a member of the "Committee of Inspection, Correspondence and Safety," which was organized to hold the tories in check. Upon the close of the war both father and son returned to their home farm and resumed their usual peaceful pursuits.

So strongly were they attached to their native soil that for five generations no member of this ancestral line ever strayed fifty miles from the original American home. But the spirit of dispersion, which afterward became so prevalent in New England, entered this conservative family and when Charles was twelve years old his father's family removed to Burlington in the then recently organized territory of Iowa. He grew up to manhood in that pioneer home, necessarily subject to its privations and disadvantages, but the rocks and hills, forests and streams round about it constituted an excellent field in which to pursue his natural bent as a young naturalist.

He revisited his old home in Dighton in 1847, and in the following year he was married there to a schoolmate of his childhood, Miss Charlotte R. Pilkington, daughter of James Pilkington, of Dighton. This marriage proved to be an ideal one and the union continued nearly fifty-four years, when the honored and beloved wife was removed by death. Eight children were born of this marriage, six of whom survive.

In 1849 he returned with his young wife to his old home at Burlington, where they lived until 1864. His eastern travel had greatly stimulated his inherent love for the natural sciences, and upon his return to his Iowa home he began their systematic study, soon becoming familiar with the geology, zoology and botany of the region in which he lived. It was at Burlington that his first scientific papers were written, and these were based upon his studies and observations there. He made many journeys to various parts of the great Mississippi Valley for geological study, and in the years 1862 and 1863 he assisted Professor James Hall in his paleontological work for New York state.

A few years after his return to Burlington, in pursuance of his long-cherished purpose, he entered the office of Dr. S. S. Ransom, a leading practitioner, as a medical student. He received earnest aid and encouragement from his preceptor, who had known him from his boyhood. He attended one full course of medical lectures at the University of Michigan, and was afterward graduated with the degree of M.D. from Rush Medical College, which is now the medical department of the University of Chicago. In 1864 he removed with his family from Burlington to Iowa City and there began the practise of medicine. His practise, however, was of comparatively short duration, and was abandoned for his more congenial scientific pursuits.

Because of the privations incident to his pioneer life, the loss of his patrimony and the consequent necessity to labor for the support of himself and his family his education, aside from his medical instruction, was desultory and irregular. Still, his industry was such that he so mastered the subjects to which he devoted himself as to become a recognized authority upon them. His services were consequently sought and accepted as a college

professor and a scientific writer, especially upon geology and paleontology.

While he was practising medicine at Iowa City he was appointed state geologist of Iowa by legislative enactment, and he assumed the duties of that office in April, 1866. He conducted that survey until 1870, when two volumes of reports were published, devoted mainly to structural and economic geology. The work was then suspended for want of legislative appropriations.

In 1866 he received the degree of master of arts from Iowa College at Grinnell.

In 1867 he was appointed to the professorship of natural history in the Iowa State University, with the understanding that he should perform only a part of the duties of that chair during the continuance of the survey, and at its close assume the full duties of the same.

He became a member of the American Association for the Advancement of Science in 1868, and a fellow, when fellowships were first established by the association.

He closed his work upon the Iowa survey in 1870, when he assumed the full duties of his professorship in the university. These duties he continued to perform until 1873, when he was called to a similar chair in Bowdoin College, which call he then accepted and removed with his family to Brunswick, Maine.

In 1874, at the request of Major (then Lieutenant) G. M. Wheeler, he undertook the publication of the invertebrate paleontology of the government survey west of the one-hundredth meridian, then under his direction. He prosecuted this work in connection with his duties at Bowdoin College until the next year, when he resigned his professorship and removed with his family to Washington, and joined the U. S. Geological Survey of the Rocky Mountain Region, in charge of Major J. W. Powell.

In 1876 he joined the U. S. Geological Survey of the Territories in charge of Dr. F. V. Hayden and remained with it until its suspension in 1879. He was appointed curator of paleontology in the U. S. National Museum in 1879, and geologist to the reorganized U. S. Geological Survey in 1882. In the latter year he was detailed to act as chief of the Artesian Wells Commission upon the Great Plains, under the auspices of the U. S. Department of Agriculture, upon the completion of which duties he returned to his work upon the survey and at the museum.

In 1882 he was commissioned by the director of the National Museum of Brazil to prepare for publication the Cretaceous invertebrates which had been collected by members of the Geological Survey of that empire. The results of this work were published at Rio de Janeiro in both Portuguese and English.

He was president of the Biological Society of Washington for the years 1883 and 1884, and vice-president of the American Association for the Advancement of Science in 1888.

He continued a member of the U. S. Geological Survey until 1892, when he resigned.

The degree of LL.D. was conferred upon him by the State University of Iowa in 1893.

He was one of the founders of the Geological Society of America.

He was elected to corresponding membership in the following academies and scientific societies: The Academy of Natural Science of Philadelphia in 1880; the Geological Society of London in 1893; Isis Gesellschaft für Naturkunde, Dresden, Saxony, in 1893; the R. Accademia Valdarnese del Poggio, Montevarchi, Italy, in 1893; the k. k. Geologische Reichsanstalt, Vienna, Austria, in 1893; the Kaiserliche Leopoldinisch-Carolinisch. Deutschen Akademie der Naturforscher, Halle, on the Saale, 1894.

In 1895, he was appointed a scientific associate of the Smithsonian Institution.

On December 20, 1899, he was elected foreign member of the Geological Society of London.

The titles of his many papers are too numerous to be given here but an annotated list of them was published in Bulletin 30 of the U. S. National Museum in 1885, a continuation of it in the *Proceedings* of the same, Vol. XX., in 1897, and the present list contains ten additional entries, making 220 in all. These titles being arranged

chronologically indicate to some extent the development, progress, scope and character of his life work. They embrace subjects pertaining to geology, paleontology, zoology, botany, anthropology, local history, medicine and domestic science. Besides these writings of permanent importance there have been many of transient interest, for Dr. White began writing for publication as early as 1847.

The prosecution of much of his geological work was of the nature of pioneer exploration, and was extended into most of the states and territories west of the Mississippi. He twice traveled extensively in Europe, the second time accompanied by his wife, when they extended their journeyings into Egypt and Palestine.

His correspondence with scientists and other noted persons both in our own country and abroad was extensive. Many of the letters thus received are preserved in the State Historical Department of Iowa, at Des Moines, where also his diplomas, testimonials, commissions, etc., are preserved. He made that disposition of those papers because he grew up to citizenship in Iowa, and always continued to regard himself as a citizen of that state.

MEETINGS OF THE ASTRONOMICAL AND ASTROPHYSICAL SOCIETY OF AMERICA AND OF THE SOLAR UNION

THE eleventh annual meeting of the Astronomical and Astrophysical Society of America will be held at the Harvard Observatory, Cambridge, Massachusetts, on Wednesday, Thursday and Friday, August 17–19, 1910. Subject to modification by the council, the program is as follows:

Wednesday, August 17—Papers, 10 A.M. to 1 P.M. Luncheon, 1–2 P.M., at the Harvard Observatory, by invitation of the director. Papers, 2–3 P.M. Excursion to the Blue Hill Meteorological Observatory, 3 P.M., by invitation of Professor A. Lawrence Rotch, director. Special cars will be in waiting to carry the party from Cambridge to the foot of Blue Hill.

Thursday, August 18—Papers, and nomination of officers, 10 A.M. to 1 P.M. Luncheon, 1–2 P.M., at the Harvard Observatory, by invitation of the director. Inspection of the Harvard Observatory, 2–3 P.M. Excursion to Wellesley College and the Whitin Observatory, 3 P.M., by invitation of the director, Professor Sarah F. Whiting, and the college authorities.

Friday, August 19—Papers and election of officers, 10 A.M. to 1 P.M. Luncheon at the Students' Astronomical Laboratory of Harvard University, 1:30 P.M., by invitation of the director, Professor R. W. Willson. Inspection of the laboratory, and papers requiring lantern illustrations, 2:30–5 P.M.

It is hoped that foreign and American visitors will come a day or two in advance of the opening session of the society, in order to inspect the work of the Harvard Observatory, and also the many institutions and objects of interest in Boston and vicinity. Harvard University has museums of zoology, archeology and art, as well as chemical and physical laboratories, etc. The medical school of the university is in Boston. In Boston, also, are the Massachusetts Institute of Technology, the Art Museum, the Public Library and other institutions of interest.

Members of the Astronomical and Astrophysical Society of America are invited to the Fourth Annual Conference of the International Solar Union, to be held at the Mount Wilson Solar Observatory, near Pasadena, Cal., August 29 to September 6, 1910. At the conclusion of the meeting of the Astronomical Society at Harvard Observatory, it is expected that a party will go together to California to attend the meeting of the Solar Union, leaving Boston, Saturday evening, August 20, 1910, in one or more special cars. The proposed itinerary, based upon existing train schedules, is as follows:

Saturday, August 20—Leave Boston at 4:50 P.M.

Sunday, August 21—Arrive at Niagara Falls at 8:27 A.M. Leave at 7:55 P.M.

Monday, August 22—Arrive at Chicago at 8:10 A.M. Visit the University of Chicago and the Ryerson Physical Laboratory. Leave at 8:00 P.M. (Dearborn Street station.)

Tuesday, August 23—Arrive at Kansas City at 9:00 A.M.